UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/777,120	02/05/2001	Arie E. Kaufman	AP30612-C-072600.0171	2426

			EXAMINER
21003	7590	03/24/2004	AZARIAN, SEYED H

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ART UNIT	PAPER NUMBER
2625	

DATE MAILED: 03/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>29 December 2003</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *51-59 and 62-72* is/are pending in the application.

  4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *51-59 and 62-72* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 May 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

  Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

  Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

  a)☐ All b)☐ Some * c)☐ None of:

    1.☐ Certified copies of the priority documents have been received.

    2.☐ Certified copies of the priority documents have been received in Application No. _____.

    3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
      application from the International Bureau (PCT Rule 17.2(a)).

  * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
   Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____ .
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: _____.

RESPONSE TO AMENDMENT

1.   Applicant's amendment filed, 12/29/2003, has been entered and made of record.

2.   Applicants' arguments with regards to Claims 51-59 and 62-72 have been fully

considered but they are not persuasive.

3.   Applicants' argues in essence that Vining does not teach, "a textural feature

indicative of an abnormality".

      Contrary to the applicant's assertion, Vining discloses a system for: "Fig. 5, the

convexity is a measure of the direction and magnitude of the shape of the surface of the

population, when the structure is a colon populations with a negative convexity value

are excluded from being considered abnormal. Further, only populations having a

positive convexity value above a minimum value are reasonably expected to be

potential lesions (abnormal texture), since cancerous colon masses are generally

manifested by steeply sloped growths, also the higher the magnitude of the convexity

value, the greater the slope of the surface of the population (column 11, line 51 through

column 12, line 17).

      In response to applicant's argument regarding combination of references, that

does not teach or suggest the use of textural features to assist in the diagnosis of

abnormalities, the fact that applicant has recognized another advantage which would

flow naturally from following the suggestion of the prior art cannot be the basis for

patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*,

227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

In response to applicant's argument, essence that there is no teaching to "3D,

voxel based representation of a region of interest", as indicated by Vining, teaches the

following features: the two dimensional images are arranged in computer memory to

create a three-dimensional data volume, to create isocubic volume elements (voxels),

(column 5, lines 29-39).

Furthermore, in response to applicant's argument, regarding "textural feature is

included in a probability density and correlation between two voxels". Vining discloses

according to such properties as size, convexity, curvature, height, mean wall thickness,

"standard deviation of wall thickness (column 12, lines 44-530).

Finally, in response to applicant's arguments that there is no teaching to

"cumulating distribution as thinning density". Additionally, Vining discloses the wall

thickness values, local convexity values, and local curvature values can be used,

independently or in conjunction (cumulating) with each other (column 10, lines 56-65).

DETAILED ACTION

Claim Rejections - 35 USC § 103

4.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

5.   Claims 51-54 and 59-65, are rejected under 35 U.S.C. 103(a) as being

unpatentable over Vining et al (U.S. patent 5,920,319) in view of Katsuragawa et al

(U.S. patent 5,319,549).

Regarding claim 51, Vining et al discloses a method of performing computed

assisted diagnosis of a region of interest, comprising (Fig. 1, column 5, lines 3-11).

Acquiring imaging scan data including at least a portion of the region of interest

(column 2, lines 55-66, images acquired by scanner to select region of interest).

Converting the imaging scan data to a volume representation including a

plurality of voxels, at least a portion of the voxels representing a surface of the region of

interest (column 6, lines 24-35, the voxels or volume of the segment region of interest

are tagged and column 10, lines 56-65, identifies abnormal thickness and curvature).

However Vining et al is silent about "textural feature of an abnormality". On the

other hand Katsuragawa et al in the same field of radiograph teaches column 4, lines

31-37, detecting of abnormal areas or geometric feature analysis according to the

invention is applied to detected abnormal region in order to characterize the nature of abnormalities.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made, to modify Vining et al invention according to the teaching of Katsuragawa et al because it provide a sequence geometric pattern relating to shape or line, circles, squares which achieves accuracy and improve image quality.

Regarding claim 52, Vining et al discloses the method of performing computed assisted diagnosis, wherein the textural feature is included in a probability density function characterizing a correlation between two voxels of the portion of voxels (column 9, lines 50-55, refer to high-density and column 5, lines 15-23, refer to low-density).

Regarding claim 53, Vining et al discloses the method of performing computed assisted diagnosis, wherein the two voxels are adjacent voxels (Fig. 10e, column 15, lines 22-37, polygon adjacent).

Regarding claim 54, Vining et al discloses the method of performing computer assisted diagnosis according to claim 52, wherein intensities of said portion of voxels are used to generate an estimate of the probability density function (column 6, lines 28-40, an intensity profile along each vertx's normal vector is calculated to measure x-ray attenuations factor and into the surrounding tissue until the voxels value).

Regarding claim 59, Vining et al discloses the method of performing computer assisted diagnosis, wherein the region of interest includes the aorta and wherein the abnormality includes abdominal aortic aneurysms (column 3, lines 53-64, refer to blood vessels and airway).

Regarding claim 60, Vining et al discloses the method of performing computer

assisted diagnosis wherein the surface is represented as a second differentiable

surface where each surface volume unit has an associate Gauss curvature and wherein

said Gauss curvatures combine to form said geometric features (column 10, lines 48-

55, area of curvature).

Regarding claim 61, Vining et al discloses the method of performing computer

assisted diagnosis wherein a plurality of predetermined geometrical feature templates

are defined and wherein the geometric features of said surface are compared to said

templates to determine a geometric feature classification (column 14, lines comparing

the conventional method by storing surface points (voxels on the outer surface of the

region-grown object).

Regarding claim 62, Vining et al discloses a method of performing computed

assisted diagnosis of a region of interest, comprising (Fig. 1, column 5, lines 3-11);

Acquiring imaging scan data including at least a portion of the region of interest

(column 2, lines 55-66, images acquired by scanner to select region of interest);

Converting the imaging scan data to a volume representation including a

plurality of voxels, at least a portion of the voxels representing a surface of the region of

interest (column 6, lines 24-35, the voxels or volume of the segment region of interest

are tagged and column 10, lines 56-65, identifies abnormal thickness and curvature);

Analyzing said portion of voxel representing a surface for a geometric feature

and a textural feature indicative of an abnormality (Fig. 5, column 11, line 51 through

column 12, line 17, the convexity is a measure of the direction and magnitude of the

shape of the surface of the population, when the structure is a colon populations with a

negative convexity value are excluded from being considered abnormal (geometric

feature), further, only populations having a positive convexity value above a minimum

value are reasonably expected to be potential lesions (abnormal texture), since

cancerous colon masses are generally manifested by steeply sloped growths, also the

higher the magnitude of the convexity value, the greater the slope of the surface of the

population), further (column 5, lines 29-39 two dimensional images are arranged in

computer memory to create a three-dimensional data volume, to create isocubic volume

elements (voxels)).

Regarding claims 63-65, recite similar limitation as claim 51 and 52 are similarly

analyzed.

6.   Claims 55-58 and 66-72, are rejected under 35 U.S.C. 103(a) as being
unpatentable over

as applied to claims above, and further in view of Yeh et al (U.S.6,125,194).

Regarding claim 55, Vining and Katsuragawa are silent about "cumulating

distribution" On the other hand Yeh et al teaches (column 15, lines 15-25, a cumulative

distribution function generation unit, a fraction estimation unit estimating one or more

suspect nodule area fractions by evaluation).

Therefore it would have been obvious to a person of ordinary skill in the art at
time the

invention was made, to modify Vining et al and Katsuragawa et al invention according to
the

teachings of Yeh et al because it provides distribution function and fraction estimating of
image

with improvements in both speed and accuracy of a suspected abnormal area and is routinely used

Regarding claim 57, Vining et al discloses the method of performing computer assisted diagnosis, wherein the distance is used to assign intensity values to the voxels representing a surface of the region of interest and wherein said method further comprises displaying said voxels such that variations in intensity represent regions of abnormality (column 6, lines 33-40, an intensity profile along each normal vector is calculated, into the surrounding tissue until the voxel values begin to decrease or increase).

Regarding claim 58, Vining et al discloses the method of performing computer-assisted diagnosis, wherein the region of interest includes the colon and wherein the abnormality includes polyps (column 7, lines 10-27, refer to grow an object or polyps).

Regarding claims 56 and 66-72, recite similar limitation as claim 51 and 55 are similarly analyzed.

Other prior art cited

7.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. patent (5,458,111) to Coin is cited for computed tomographic colonoscopy.

U.S. patent (5,361,763) to Kao et al is cited for method for segmenting features in an image.

U.S. patent (5,101,475) to Kaufman et al is cited for method and apparatus for generating arbitrary projections of three-dimensional voxel-based data.

U.S. patent (5,095,521) to Trousset et al is cited method for the computing and imaging of view of an object.

Conclusion

8.   **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

9.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Seyed Azarian whose telephone number is (703) 306-5907. The examiner can normally be reached on Monday through Thursday from 6:00 a.m. to 7:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta, can be reached at (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR.
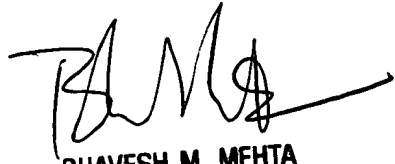
Status information about the PAIR system, see http:// pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Seyed Azarian

Patent Examiner

Group Art Unit 2625

February 29, 2004

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